A FISH KILL ON THE KATHERINE RIVER, NOVEMBER 1987

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Introduction

Although fish kills in the coastal rivers of the Northern Territory appear to be an almost annual occurrence at the beginning of the wet season, few of these events have been properly documented, and the ecological processes involved are still little understood.

Bishop (1980) and Brown *et al* (1983) reported fish kills in the East Alligator River system, while Jeffree and Williams (1975) noted a fish kill in the Finniss River. Recent reports of fish kills have come from the upper reaches of the South Alligator, and Adelaide River systems, and from the Mary River wetlands (G. White, pers. comm.). The following is the first documented occurrence of a fish kill in the Katherine River.

Description of the Event

A storm apparently hit the upper catchment of Maud Creek on the night of 31 October 1987, causing a flush into the Katherine River. Next day, a small fish kill was reported to have occurred at a set of rapids which mark the upstream limits of Donkey Camp billabong. The extent of this fish kill is unknown, although Barramundi and Fork-tailed Catfish were affected. Another storm hit the Maud Creek catchment on the night of November 5, and again the Katherine River was inundated, rising several metres. A few days later, when the level subsided, an estimated 5000+ fishes were observed dead on the northern bank of Donkey Camp, directly opposite the N.T. Power and Water Authority's out-take station for the Katherine water supply. As the putrification of these fishes posed a public health risk, most were cleaned up and removed on November 11.

Methods

An inspection of the site was made on 12 November 1987, and data collected on the remaining fishes. Examination of the entire area by boat and helicopter revealed that the fish kill site was entirely restricted to an area of rapids at the downstream end of Donkey Camp billabong. The majority of the fishes had been beached along a sandy part of the waterhole about 100m long. As these had all been cleaned up, data were collected on an undisturbed stretch of dead fishes which were

seemingly stranded in a rocky offshoot of the main billabong when the water receded. Very few dead fishes were observed floating in the billabong itself. The decomposed state of most specimens made identifications difficult, and autopsy impossible.

Two transects were analyzed. Each constituted a stretch of shoreline 10m long, with a width of 4m, which had the highest concentration of undisturbed fishes. The number of large fishes (Total Length >180mm) of each species occurring on each transect was counted. The presence of small species, and small individuals of the larger species was also noted. However, as these smaller fishes constituted a very minor part of the biomass, and because of the distinct possibility that most had been eaten by birds, these smaller individuals were not examined quantitatively. Data for the two transects were added, and the results compared with similar data from the Magela Creek (Bishop, 1980).

Results

A complete list of species found, along with an estimate of the numbers left after the clean-up is provided in Appendix A. Some of the more isolated pools above the main fish kill site were observed to contain small populations of living fishes. Two species in particular, the Red-finned Rainbowfish and the Barred Grunter were surviving in these pools. One large, and badly damaged specimen of the Blue Catfish was also found in one of these pools.

Species which were observed or netted alive in the Donkey Camp billabong were the Barred Grunter, Red-finned Rainbowfish, Reticulated Perchlet, Bony Bream and Black Catfish. It is not known whether these living fishes actually survived the kill, or migrated into the area afterwards. At the height of the fish kill, a total of thirteen Barramundi were "rescued", and re-released into an aquaculture pond where all were still alive several days later. Of the smaller fishes present in the fish kill, the vast majority were juvenile (TL <50mm) Bony Bream. A number of these juvenile fishes were also observed floating in a near-dead condition in the billabong several days after the main kill.

Along with the fishes, vast numbers of Freshwater Prawns *Macrobrachium rosenbergii* were also killed. Two turtles *Emydura victoriae* and one Agile Wallaby *Macropus agilis* also died in the event. It is possible that these animals died either through drinking the putrid water, or were drowned in the flood conditions. Two Freshwater Crocodiles *Crocodylus johnstoni* were alive and well at the site. No dead birds were seen in the area, although numerous hawks and egrets had gathered to feed on the dead fish.

Discussion

The fish kill seemed to be caused by the flushing of poor quality water from the Maud Creek catchment into the main river channel, in the absence of a similar flush

of clean water from the Katherine River itself, which would have had a dilution effect. As all of the killed fish were located at the downstream end of the billabong, it is likely that they were either swept there by the current, or had travelled down ahead of the slug, only to become trapped at the rapids. Another possibility is that the fishes were already congregating at the downstream outflow at the time of the event. At this time of year, many species habitually descend to the lower reaches of the river system to breed, and mass migrations can occur with the first flush of the season.

The precise cause of death is difficult to determine. It has been generally assumed that these phenomena are caused by a lowering of the dissolved oxygen content of the waters, brought about by mixing of anoxic bottom waters, or by the oxidation of materials brought in by the first floods. This was the reason attributed to the fish kill on the Magela Creek in 1978 (Bishop, 1980), which has some parallels to the Katherine event. In both cases, most of the affected fishes were large species. Ox-eyed Herring were relatively unaffected by the kill, even though they were known to be common in the area.

This species is known to be able to survive low oxygen conditions (Merrick & Schmida 1984). Also, both fish kills occurred at the downstream end of a large billabong, where the fishes were apparently trapped, and both were preceded by minor fish kills in the same area. The kill density recorded in the Katherine event is about 3 times higher than that recorded by Bishop (1980) on the Magela (Appendix B).

Brown *et al* (1983) have postulated that acid water runoff (pH 2.4) and subsequently high aluminium levels (500 ugL-1) caused another fish kill on the Magela in 1980. Bishop et al (1982) suggested that naturally occurring toxins could cause fish kills. They listed numerous plants which, under certain circumstances, could release toxic saponins into the river systems. Some of these species, such as *Barringtonia acutangula*, *Acacia auriculiformis*, and *Owenia vernicosa* are very common in the Katherine area.

Jeffree and Williams (1975) reported on man-induced fish kills in the Finniss River caused by heavy metal pollution from a uranium mine site which had been flushed in the absence of a strong flow in the main river. The fishes reportedly killed in these events were generally smaller in size than those observed in the Katherine or Magela Creek fish kills (Appendix C).

It is likely that many factors play a role in these fish kills. Low dissolved oxygen levels may be present in most fish kill situations, but may not be the cause. In the Katherine event, the evidence suggests that the larger species were selectively killed, and that even juveniles of the larger species (eg. Bony Bream) were affected more than adults of the small species. Many individuals which survived the initial

kill did recover, suggesting that the adverse conditions were quite temporary, although the putrified water from the already decomposing fishes must have had a multiplier effect.

References

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Appendix A
Fish species killed in the Katherine River, near Donkey Camp, during November 1987.

Common Name	Scientific Name	No.+
Ox-eye Herring	*Megalops cyprinoides*	*
Bony Bream	*Nematolosa erebi*	***
Blue Catfish	*Arius graeffei*	***
Salmon Catfish	*Arius leptaspis*	**
Eel-tailed Catfish	*Neosilurus hyrtlii*	*
Long Tom	*Strongylura kreffti*	*
Red-finned Rainbowfish	*Melanotaenia splendida australis*	**
Strawman	*Quirichthys stramineus*	**
Sail-fin Perchlet	*Ambassis a. agrammus*	**
Reticulated Perchlet	*Ambassis macleayi*	*
Barramundi	*Lates calcarifer*	**
Barred Grunter	*Amniataba percoides*	*
Black Bream	*Hephaestus fuliginosus*	**
Spangled Grunter	*Leiopotherapon unicolor*	*
Sharp-nosed Grunter	*Syncomistes butleri*	*
Mouth Almighty	*Glossamia aprion*	*
Archer Fish	*Toxotes chatareus*	*
Giant Gudgeon	*Oxyeleotris herwerdenii*	*

+ approximate number observed dead: *<10; **10-50; ***>100.

Appendix B

Numbers of large (TL >18cm) fishes in samples taken at Katherine River, 1987 (present study) and Magela Ck, 1978 (Bishop, 1980).

Fish Genus	No. Recorded (% of total)	
	Katherine R, 1987	Magela Ck, 1978
Nematolosa	185 (59.9)	6 (2.1)
Arius	77 (24.9)	27 (9.5)
Hephaestus	25 (8.1)	-
Lates	19 (6.1)	27 (9.5)
Strongylura	3 (1.0)	2 (0.1)
Liza	-	198 (69.7)
Neosilurus	-	23 (8.1)
Glossamia	-	1 (0.3)
	N=309	N=284
Kill Density (No./m of bank)	**3.86**	**0.12 - 1.35**

Appendix C
Fish genera (ranked in approximate descending order of size) observed in some fish kills in the rivers of the Northern Territory.

Fish Genus	Katherine 1987	Magela 1978	Finniss 1975
Lates	x	x	
Arius	x	x	
Megalops	x		x
Liza		x	
Oxyeleotris	x		x
Hephaestus	x		
Syncomistes	x		
Nematolosa	x	x	
Strongylura	x	x	x
Toxotes	x		
Leiopotherapon	x	x	x
Neosilurus	x	x	x
Amniataba	x		
Glossogobius			x
Glossamia	x	x	x
Ambassis	x	x	x
Melanotaenia	x		x
Quirichthys	x		
Craterocephalus	x		
TOTAL No	**16**	**9**	**10**